



Expedited Lake TMDLs

In September of 2002, the NJDEP signed a Memorandum of Agreement with the USEPA in which New Jersey committed to produce 25 phosphorus TMDLs for eutrophic lakes. These TMDLs were to be established in an expedited fashion with some being adopted in March 2003 and the rest in June 2003. While the listing is for eutrophication, the pollutant of concern for these TMDLs is total phosphorus. Phosphorus is an essential nutrient for plants and algae, but is considered a pollutant when it stimulates excessive growth (primary production). Excessive primary production can cause use impairments for the lake in the form of algal blooms or excessive growth of aquatic plants. These TMDLs serve as the foundation on which management approaches will be developed to restore eutrophic lakes to attain applicable surface water quality standards and restore designated uses.

TMDL Calculation

Phosphorus sources were characterized on an annual scale (kg TP/yr). Point sources of phosphorus other than stormwater were identified, including all major and minor municipal discharges and combined sewer overflows within each lakeshed. Other types of discharges, such as industrial, were not included because their contribution of phosphorus, if any, is negligible. Runoff from land surfaces comprises most of the nonpoint and stormwater sources of phosphorus into these lakes. Watershed loads for total phosphorus were estimated using the Unit Areal Load (UAL) methodology, which applies pollutant export coefficients obtained from literature sources to the land use patterns within the watershed. Land use was determined using the Department's 1995/1997 GIS Land Use coverage. Finally, groundwater loads were estimated for lakes known to have a substantial groundwater flow component.

Empirical models were used to relate annual phosphorus load and steady-state in-lake concentration of total phosphorus. Using estimated physical parameters and current loads, the predicted steady-state phosphorus concentration of each lake was calculated. Overall reductions necessary to attain the target steady state concentration of total phosphorus in each lake were calculated by comparing the current condition to the target condition. The overall load reductions that must be reached could be achieved by various combinations of reductions from the eight source categories identified. In most cases, more detailed characterization of loads and lake processes are proposed to be carried out as a prerequisite to development of a lake restoration plan, which will evaluate various scenarios for load reduction and other management measures that will most effectively achieve the desired result.

Implementation

The next steps toward implementation are preparation of Lake Characterizations and Lake Restoration plans, where they have not already been developed. The implementation plan calls for collection of focused data and the development of a Lake Restoration Plan for each lake, as needed. The schedules for lake characterization and development of Lake Restoration Plans to implement these TMDLs are provided in the TMDL Document.

Lake Characterization

Additional monitoring may be performed in order to develop the Lake Restoration Plans to implement these TMDLs. The level of characterization needed will be specific to individual lakes depending on the range of feasible remedial options being considered.

For shallow lakes, vegetation mapping will be performed using shore to center transects, measuring density and composition (emergents, rooted floaters, submergents, free-floating plants, submerged macro-algae). Sampling should be as follows:

- 1 - 5 mid-lake sampling stations as needed to characterize the lake
 - at least 2 samples per station per day; minimum 4 samples per trip
 - Secchi depths
- Chemistry (nutrients, chlorophyll-a, etc.)
 - surface, metalimnion, hypolimnion, and bottom if stratified
 - otherwise surface and bottom
- Biology (integrated sample from mixed surface layer)
 - algal abundance and composition (greens, diatoms, blue-greens)
 - zooplankton abundance, composition and size ranges
- DO, temperature and pH profiles (hourly throughout the day)

Where necessary, flow and water quality measurements of influent and effluent streams will be taken periodically from spring to fall, and fish abundance and composition will be assessed in early autumn.

Lake Restoration Plans

In addition to nutrient load reductions identified in the TMDLs or modified as a result of the characterization work, the plans will consider in-lake measures that need to be taken to achieve goals. In addition, the plans will consider the ecology of the lake and adjust the eutrophication indicator target as necessary to protect the designated uses. The Lake Restoration Plans for each lake will need to consider the ecological nuances of shallow vs. deep lakes.

Lake Monitoring Network

In order to track effectiveness of remediation measures (including TMDLs) and to develop baseline and trend information on lakes, the Department will augment its ambient monitoring program to include lakes on a rotating schedule. The details of a new Lakes Monitoring Network will be published on the Department's website by December 31, 2003. Follow-up monitoring will include:

- Evaluations of algal blooms and aquatic vegetation
- Measurements such as
 - Secchi depths
 - nutrient concentrations
 - chlorophyll-a
 - dissolved oxygen, temperature and pH profiles
- Hydrologic and Morphometric Information
 - discharge
 - bathymetry